The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GERHARD BEITEL, ANNETTE SANGER, and WALTER HARTNER

Appeal No. 2005-2276
Application No. 09/734,467

ON BRIEF

Before GARRIS, WALTZ, and PAWLIKOWSKI, Administrative Patent Judges.

GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal which involves claims 1-3, 7, 11-13, 15, 17, and 19-23.

The subject matter on appeal relates to a method of producing a structured layer (e.g., an electrode for a storage capacitor of an integrated memory device; see specification, page 1). The method comprises applying a precious metal and a donor material containing an additive onto a prestructured substrate in two or more layers, heating the layers between approximately 400°C – 800°C so that the additive diffuses into the precious metal to form an alloy layer, and polishing the alloy layer by chemical and mechanical means. See specification, page 6. This appealed subject matter is adequately represented by independent claim 1, which reads as follows:

1. A method of producing a structured layer, which comprises the following steps:

providing a prestructured substrate;

applying to the prestructured substrate a precious metal and a donor material containing an additive which is not a precious metal in two or more layers;

subjecting the layers to heat treatment at a temperature of between approximately 400°C and approximately 800°C, such that the additive diffuses into the precious metal and an alloy layer is produced; and

polishing the alloy layer by chemical and mechanical means.

The references set forth below are relied upon by the examiner in the Section 103 rejections before us:

Azuma et al. (Azuma)	5,708,302	Jan. 13, 1998
Kawakubo et al. (Kawakubo)	5,952,687	Sep. 14, 1999
Kirlin et al. (Kirlin)	5,976,928	Nov. 02, 1999
Russell et al. (Russell)	6,395,194	May 28, 2002 (filed Dec. 18, 1998)

Claims 1-3, 7, 11-13, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakubo in view of Azuma.

Claims 19-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakubo in view of Azuma and Russell.

Claims 19, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakubo in view of Azuma and Kirlin.

We refer to the brief and the reply brief and to the answer for a complete discussion of the opposing viewpoints expressed by the Appellants and by the Examiner concerning the above noted rejections.

OPINION

For the reasons set forth below, these rejections cannot be sustained.

On pages 4-5 of the answer, the examiner supports his finding of obviousness with respect to appealed claim 1 as follows:

> Kawakubo et al teach a method that comprises providing a prestructured substrate 1;
>
> Applying to the prestructured substrate a precious metal 13 to serve as a bottom electrode; and
>
> Polishing the precious metal 13.
>
> See, for example, Figs. 48 [sic] to 4D and 6 and accompanying text.
>
> However, Kawakubo et al do not teach that the bottom electrode is formed by applying a precious metal and a donor material and subjecting the layers to a heat treatment.
>
> Azuma et al teaches a method for forming a bottom electrode that comprises forming a Ti or Ta (donor material) layer 34 followed by forming a Pt (precious metal) layer 36; subjecting the layers to heat treatment at a temperature of between approximately 450°C and approximately 1000°C (col. 8, lines 37-40), such that the Ti or Ta layer 34 diffuses into the Pt layer and an alloy layer 38 is produced, wherein the thickness of the donor material is selected such that during heat treatment the donor material essentially diffuses completely into the precious metal (col. 5, lines 11-14). See Fig. 1 and accompanying text.
>
> It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kawakubo et al by forming the bottom electrode using the method taught by Azuma et al because a person of ordinary skill in the art at the time the invention was made would have been motivated to use the method taught by Azuma et al in order to form a bottom electrode that adheres well to the underlying layers and does not have short-inducing surface irregularities (see Azuma et al, col. 1, lines 53-59).

The claimed invention must be considered as a whole, and the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of

making the combination. *See Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Company et al.,* 730 F. 2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984). With this precedent in mind, we turn to the examiner's section 103 rejections. We are unconvinced that the applied prior art as a whole would have suggested the combination as proposed by the examiner.

The examiner believes an artisan would have been motivated to combine Kawakubo and Azuma "in order to form a bottom electrode that adheres well to the underlying layers" (answer, page 5). However, Kawakubo does not disclose any adherence problem between the electrode and the underlying layers. The appellants have correctly argued that Kawakubo uses a Pt-Ti alloy for the electrode and thus already provides good adherence between the bottom electrode and the underlying layers. That is, titanium (which is used in Kawakubo's electrode) is known to adhere well to precious metal layers (e.g., platinum which is also used in Kawakubo electrode) and to underlying layers (see Azuma, column 1, lines 27-37). Therefore, an artisan would not have been motivated to modify Kawakubo in the above quoted manner for the purpose of improving adherence of the electrode as stated by the examiner.

In regard to avoiding surface irregularities as a basis for motivation, Kawakubo teaches that "metal flow" (i.e., surface irregularities) happens during chemical-mechanical polishing (CMP) when soft noble metals are used in forming the bottom electrode (see the paragraph bridging columns 5 and 6). To solve this problem, Kawakubo employs an alloy of noble metal and additive elements such as titanium to make the metal harder, so that the CMP will not damage the harder alloy (col. 6, lines 7-14). On the other hand, Azuma discloses that cracking, peeling and surface irregularity problems occur because of different thermal expansion

coefficients in the respective layers (see column 1, lines 17-20). Azuma further discloses applying a titanium adhesion layer between the poorly bonding layers to reduce cracking (i.e., by providing better bonding between the layers) (column 1, lines 34-37). Although both references may be concerned with surface irregularities in a very broad sense, the examiner does not seem to recognize that the type of surface irregularities and the causes and the solutions of these surface irregularities are different in each reference. Therefore, an artisan would not have been motivated to modify Kawakubo to avoid "short-inducing surface irregularities" as urged by the examiner particularly because Kawakubo's aforementioned solution (i.e., use of Pt-Ti alloy) already avoids the occurrence of "metal flow" or surface irregularities.

The above discussed rejection is further deficient in another respect. There is no suggestion that the semiconductor memory device of Kawakubo would not be damaged if subjected to the high temperature heat treatment of Azuma. Therefore, an artisan would have been discouraged from providing Kawakubo's process with Azuma's heating step due to the possibility that the high temperature could damage or destroy the semiconductor memory device. Stated differently, such a provision would not have a reasonable expectation for success as required for obviousness under Section 103. *See In re O'Farrell*, 853 F.2d 894, 903-904, 7 USPQ 2d 1673, 1681.

For the above stated reasons, we cannot sustain the examiner's Section 103 rejection of appealed independent claim 1 along with claims 2-3, 7, 11-13, 15 and 17 as being obvious over

the combined disclosures of Kawakubo and Azuma. Because the other applied references have not been relied upon by the examiner to supply these deficiencies of Kawakubo and Azuma, we also cannot sustain the Section 103 rejections of claims 19-21 and 23 as being unpatentable over the combined disclosures of Kawakubo and Azuma in view of Russell or of claims 19, 20 and 22 as being unpatentable over the combined disclosures of Kawakubo and Azuma in view of Kirlin.

The decision of the examiner is reversed.

REVERSED

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Administrative Patent Judge)
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